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BIOFUELS ANNUAL

Japan To Focus on Next Generation Biofuels

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Report Highlights:
Government and private sector research and investment in biofuels have been on the rise since Japan's first biomass plan, "Biomass Nippon Strategy," was unveiled in December 2002. That Strategy was updated in 2008, and the Government of Japan's (GOJ's) current thinking, given limited agricultural resources, is to focus very determinedly on cellulosic biofuel as the future for Japan's biofuel production. Ethanol production for fuel in 2008 was 90 kl, biodiesel production was roughly 10,000 kl and ETBE imports were roughly 6,500 kl.

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Executive Summary:

Government and private sector research and investment in biofuels have been on the rise since Japan's first biomass plan, "Biomass Nippon Strategy," was unveiled in December 2002. That Strategy was updated in 2008, and the Government of Japan's (GOJ's) current thinking, given limited agricultural resources, is to focus very determinedly on cellulosic biofuel as the future for Japan's biofuel production.

During the past few years, as food prices have increased and food insecurity in Japan and around the world captured headlines, biofuels have been under increasing criticism by Japanese lawmakers and media, often bearing the blame for those higher prices. Indeed, in this connection, the GOJ proposed to add rising food prices and food security to the agenda of G-8 Summit held in July 2008 in Hokkaido, Japan.

Despite the slight backlash, the GOJ and private sector continue to pursue biofuels production through conventional and cellulosic means. Indeed, since Japan's greenhouse gas emissions in fiscal year 2007 increased by 8.7% from the 1990 level the GOJ is under pressure to turn that around in order to meet Kyoto Protocol commitments. However, given Japan's limited agricultural production it will be very difficult for Japan to produce enough biofuels to impact the domestic fuel market and thereby greenhouse gas emissions without a major technological breakthrough, e.g. cellulosic technology.

The media coverage on biofuels has decreased significantly as oil prices have dropped from high levels in 2008 and the fever subsided.

Author Defined:

BIO-FUELS POLICY

Ministries Involved in the Bio-fuels Policy

Several ministries collaborate on Japan's bio-fuels policy: The Ministry of Economy, Trade and Industry (METI), the Ministry of Agriculture Forestry and Fisheries (MAFF), the Ministry of Environment (MOE), the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Ministry of Land, Infrastructure and Transport (MLIT), and the Ministry of Internal Affairs and Communications (MIC). Substantial discussions and coordination among the ministries are done in the Executive Committee on Biomass Nippon Strategy, which is formed by director-general level officials of the ministries concerned. MOE's main concern is meeting Kyoto Protocol commitments, preventing global warming, and expanding the conversion of waste products into energy. METI collaborates with industry and is interested in analyzing the cost-benefit of shifting to renewable fuels and their impact on automobiles and infrastructure and is thus involved heavily in feasibility studies. While MAFF is interested in utilizing existing biomass (sugarcane, woody materials, rice, and rice straws and husks, etc.) in the production of energy the focus has shifted toward cellulosic methods and away from increasing production of biomass, per se. The New Energy and Industrial Technology Development Organization (NEDO) is overseen by METI and manages R&D project planning and development and post-project technology evaluation functions on a wide range of topics. NEDO is managing several of the biomass studies ongoing in Japan.

Policy Overview

Japan's first biofuel plan, "Biomass Nippon Strategy," was unveiled in December 2002 with four pillars: 1) Preventing global warming; 2) Formulating a recycling society; 3) Nurturing strategic industry, and 4) Revitalizing rural communities. When the Kyoto protocol was ratified in February 2005, Japan felt compelled to shift to high gear in promoting biofuels to meet its commitment to reduce CO_2 emissions by 6 percent from the 1990 level by 2010. Accordingly, in March 2006, Japan revised the Biomass Nippon Strategy to emphasize promoting the use of biofuels for transportation. It set a goal to replace fossil fuels with 500,000 kl (oil basis) of biofuels for the transportation sector by 2010. In February 2007, the Executive Committee on Biomass Nippon Strategy released a report titled "Boosting the Production of Biofuels in Japan." The report presented to the Prime Minister states that Japan will be able to produce 6 million kl of biofuels domestically by around 2030 if appropriate technical development is achieved. It sets a target to produce 50,000 kl of biofuels from molasses and off-spec rice by 2011 and 6 million kl (estimation by MAFF) of biofuels per year, 10% of domestic fuel consumption, from cellulosic materials such as rice straw, tinned wood and resource crops by around 2030. The ambitious target is based on the estimation that Japan has unused biomass resources (non-edible portions of farm crops and forestry residues) equivalent to 14 million kl of oil and that it could produce resource crops equivalent to 6.2 million kl of oil by fully utilizing the abandoned arable land, which is estimated at 386,000 ha. MAFF's aim is not shared by all Ministries, but MAFF is optimistic that by putting all its efforts and considerable financial backing into cellulosic research and development that they can meet this goal.

Government Incentives and Import Regimes

In 2008 the GOJ introduced tax incentives to encourage the use of bioethanol. If a fuel contains 3 percent bioethanol, the gas tax is lowered by ¥1.6 per liter (approximately USD .02). This tax measure has a set time frame being effective until March 31, 2013. In order to guarantee bio-gasoline quality, the GOJ has implemented a registration system for bio-gasoline blenders. These two measures are included in the amendment of the gasoline quality control law, which is supervised by METI.

On May 21, 2008 the Diet approved unanimously a bill to promote using biomass resources to produce biofuels. The legislation includes tax breaks and financial assistance for biofuel manufacturers and farmers producing feedstock, such as agricultural cooperatives and private businesses. The government encourages collaboration of those two groups, and their plans will be monitored by MAFF in order to qualify for the benefits. Under the scheme, the fixed property tax for newly built biofuel facilities will be reduced in half for three years. Interest-free loans for a redemption period of ten years will be provided to farmers producing feedstock.

In addition, the import tariff on Ethyl tert-butyl ether ETBE (3 yen/liter) will continue to be removed this year.

Bio-diesel Policy

With respect to bio-diesel, the GOJ decided that the blending ratio of Fatty Acid Methyl Ester (FAME) into light oil should be less than 5 percent, in order to ensure that the fuel meets safety and gas emissions standards for existing vehicles in the market. This new requirement was added in the Light Oil Standard under the Quality Control Law and became effective in March 2007. In Japan, because 100 percent bio-diesel fuel (B100) is not subject to the light oil transaction tax, many regional governments have initiated measures to use competitive B100 for their official vehicles, such as garbage trucks. However some have pointed out that problems may occur because automobiles distributed in Japan are not designed to use B100. Indeed, recent media reports state that a number of troubles with engines are reported for using B100. According to the reports, the trouble is caused when the fuel filter is clogged with impurities in the fuel made from wasted edible oil.

BIOFUEL MARKET CONDITION

Japan's Motor Vehicles Petroleum Based Energy Market

According to the Japan Automobile Manufactures Association (JAMA), there are 74 million automobiles in Japan (gas and diesel) and domestic fuel consumption is around 60 million kl per year for gasoline and 36 million kl per year for diesel. If a three percent ethanol blend gasoline (E3) were nationalized, it is estimated that demand for ethanol would be around 1.8 million kl. In the case of 10 percent ethanol blend gasoline (E10), demand would be 6 million kl per year.

Japan's Gasoline Market

The Japanese gasoline market is made up of large companies. There are no independent dealers. Only a handful of companies import oil and/or gasoline. These roughly ten companies are organized into four groups, and they sell to their own contacts through a formalized distribution system. The companies form the Petroleum Association of Japan (PAJ). In April 2007, PAJ imported 7,500 kl of ETBE from France and mixed it with gasoline at a refinery in Yokohama to make a 7 percent ETBE blend. From April 27, 2007 PAJ started to sell bio-gasoline as an alternative to regular fuel for the first time on a commercial basis at 50 gasoline stations in the greater Tokyo area. In April 2008, PAJ imported approximately 6,500 kl of ETBE from Brazil; where the price is reportedly 20-30% lower than its competitor in Europe. In October 2008, PAJ announced that it has entered into a long term contract with

Copersucar, the Brazilian supplier of bioethanol, to purchase 200,000 kl per year. The ethanol will be shipped to the U.S. to produce ETBE which then will be exported to Japan. 200 thousand kl of ETBE are likely imported from the U.S. in 2009. PAJ aims at expanding the sales of bio-gasoline nationwide to 210 thousand kl by 2010.

METI is subsidizing a project to test market fuel derived from biomass. Bio-gasoline is currently sold at the same price as that of regular gasoline though the production cost is higher. The difference is borne by the GOJ and the industry. The current government support is planned to last another year. A plan for succeeding years has not yet been decided.

Debate on Direct Blending or ETBE

There are two methods for blending bio-ethanol with gasoline, "direct blending" and "ETBE." In Japan, MOE promotes direct blending while METI supports the ETBE method. The reason for the latter is that it is more costly for oil distributors to renovate the facilities for direct blending. One report estimates the cost to replace or upgrade existing infrastructure would be Y300-500 billion ($3-5 billion). MAFF has favored promoting direct blending. However, it is yielding to support the ETBE method in order to secure the distribution channel for domestically produced bio-ethanol. Hokuren, the federation of agricultural cooperatives in Hokkaido, plans to sell the bio-ethanol they produce to PAJ for blending with ETBE.

Japan's Ethanol Blend Limit

Japan's ethanol blend limit remains low by U.S. standards at 3 percent. A number of potential hazards have been raised, including automobile part corrosion. However, there are feasibility studies looking at the potential for introducing a 10 percent blend in the future. MOE, at present, aims at introducing E10 to the market in 2012. Japanese automakers have started to introduce some new models that can run on E10. Reportedly, Toyota Motor Corp. has agreed to supply two vehicles to the Ministry of Transportation for use in road testing an E10 ethanol blend in Osaka prefecture. Nissan Motor Co. has received approval from the GOJ for an E10 version of its Murano. However, in general the car industry has not embraced ethanol as a blend for its cars' fuel.

The GOJ has a rigorous testing and monitoring scheme to measure the effects of E3 on vehicles and the environment and how best to introduce ethanol to the market. In 2004 and 2005, METI commissioned the Japan Petroleum Energy Center to conduct experimental studies on the prospects for buying or producing, distributing and using ethanol-blended fuel. The ethanol is refined in Yokohama and distributed to service stations in: Akita, Chiba, Toyama, Mie, Osaka and Fukuoka Prefectures.

E3 usage is still quite limited in Japan. For example, in Osaka one can easily count the number of cars that are registered to use E3 gasoline: 576. Only six gasoline stations in the Osaka and nearby Hyogo prefectures sell E3 gasoline. This is a project supported by MOE who promotes the direct blending method. Meanwhile, PAJ started selling bio-gasoline (regular gasoline blended with bio-ETBE) in those areas. Two different types of biofuels are actually competing in the market, and the competition will expand as Petrobras, the Brazilian state-run oil supplier, plans to begin selling E3 gasoline in the Tokyo metropolitan area as early as this summer. The firm will sell E3 gasoline to the gas stations who are not affiliated with the member companies of PAJ. Though the production cost is higher than that of regular gasoline, the E3 gasoline will be sold at the same price thanks to subsidies from MOE.

DOMESTIC PRODUCTION OF BIOFUELS

Ethanol Production

The initial thrust of Japan's biofuels movement focused on traditional production techniques, analogous to those used in the United States and other producing countries. MAFF has joint partnerships with local agricultural cooperatives, alcohol and trading companies to operate several model plants. MOE, METI and others also have a number of projects in the works. Following is a description of a select few of the model plants and facilities in Japan.

Utilizing MAFF's subsidies, which pay for up to 50 percent of the cost of building plants, two major facilities were built in Hokkaido, Japan's agricultural heartland, for launch in April 2009: One is in Tomakomai and is using rice; and the other is in Shimizucho and intends to use off-spec wheat and sugar beets. The project in Shimuzucho is a public-private partnership between Mitsubishi Corp. and Hokuren, the federation of agricultural cooperatives in Hokkaido. These are expected to become the first commercially-viable ethanol plants in Japan with a planned annual production of 15,000 KL each. That ethanol will be used to produce ETBE. In order to produce 15,000 KL of ethanol, approximately 33,000 MT of rice, 35,000 MT of wheat or 150,000 MT of sugar beets are needed. A third facility in Obihiro City, Hokkaido is run by the Tokachi Foundation and is supported by prefectural and national funds. The Foundation runs a very small still that converts Hokkaido-grown wheat into ethanol to fuel a single test vehicle. The equipment is all state of the art, expensive, and on a miniature scale. The Foundation says that this is a 'proof of concept' project intended simply to see whether they could produce ethanol from wheat to fuel the vehicle.

There is one model plant in Niigata that is a joint operation with Zen-noh. It uses high yield rice grown specifically for biofuel production (800 kg/1000 m2 vs 500 kg/m2 for food use rice). The project began in 2006 using fallow land set aside in MAFF's acreage reduction plan. Early this year the facility has begun to produce 1000 kl of bioethanol requiring about 2,250

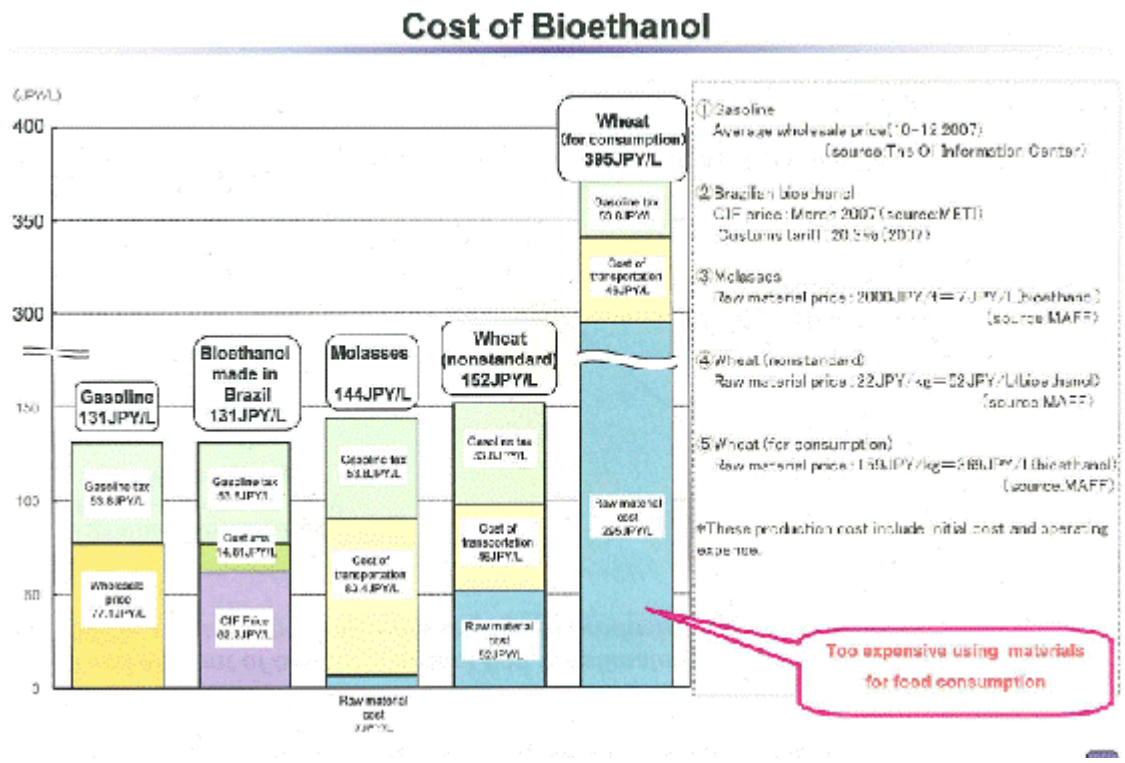
tons of rice. The ethanol is used as part of an E3 blend and started to be sold at 20 affiliated gas stations around Niigata prefecture this March.

In addition, there are ten more ethanol facilities nationwide including one in Okinawa using sugar cane as the fuel stock. All those are small-scale built for bioethanol verification projects supported by GOJ.

In order for these plants to make commercial sense, these commodities must be purchased at a significantly lower-than-market price. In the case of rice, it would have to be cheaper than feed-quality rice, which is already one-fifth the price of table rice. Like rice, prices of wheat and sugar beets are also very tightly managed by the government. Therefore, there is little incentive for farmers to sell these commodities at a price these ethanol plants can afford unless the GOJ provides an additional incentive to support the price gap.

The above-mentioned pilot projects and small-scale production facilities will not be enough to meet the goal to domestically produce of 50,000 kl of bioethanol by 2011 and the target to replace fossil fuels with 500,000 kl (oil basis) by 2010. Thus, the emphasis has shifted to research and development of cellulosic technology using readily available inputs that will not compete with the food supply, e.g. rice straw. The budget request that MAFF submitted for fiscal 2008 was ¥ 3.2 billion (approximately USD 34 million) – indeed the Minister himself requested the money – for soft-cellulosic research. Three projects were selected through an RFP process to produce ethanol from rice straw and husk and wheat straw. MAFF contributes 50 percent of the project costs.

Figure 1 Production Cost of Bioethanol



Source: MAFF

Bio-diesel Production

Municipal governments and regional NPOs conducting small-scale bio-diesel feasibility projects have increased to 12 from five in fiscal 2007. A couple of restaurant chain operators are cooperating in the projects to collect used vegetable oil. The oil is processed into bio-diesel fuel for use in government vehicles or municipal buses. The current annual production of bio-diesel fuel is estimated to be 10,000 kl per annum.

In May 2006, Nippon Oil Corporation and Toyota Motor Corporation announced that they jointly developed a palm oil-based bio-diesel that performs comparably to gasoline. They claim to have removed the oxygen from the palm oil, which would normally cause the fuel to degrade. Nippon Oil aims to develop a commercially viable bio-diesel by 2010.

Impact Of Use Of Agricultural Feed Stocks In Biofuel Production On Existing Markets

Previously, biofuels policy aimed at nurturing agriculture and revitalizing rural communities and one of the ways of doing so was increasing agricultural production. Also included in the initial plan but now receiving the most focus is utilizing existing feed stocks such as rice straw and off-spec wheat. This is in part a reaction to the "food vs. fuel" debate that has received

media attention in Japan. It also reflects a strategic refocus on how Japan can best achieve its goals in the biofuels sector. Thus, taking used vegetable oil, rice straw or even certain rice stocks off the market doesn't take away from existing markets for feed, etc. Even if these ethanol plants absorb traditional commodities like rice or sugar beets, their impact on the existing food and feed markets would be negligible because the amounts are fractions of total supplies of these commodities in Japan: rice about 0.4 percent; wheat, 0.6 percent; and sugar beets, 3.5 percent.

BILATERAL TRADE AND INVESTMENT

Trade

While Japan imports measurable amounts of ethanol for industrial use, roughly 453,000 kl in 2008, imports of ethanol for transportation are negligible. Future imports of ethanol for fuel may be possible from Brazil given the joint ventures established between Japanese and Brazilian firms.

ETBE imports are more significant in Japan and have just taken off in the past two years. Prior to 2007 no imports were recorded but, as noted in the prior section -Japan's Gasoline Market, 7,500 kl of ETBE were imported from France in 2007 and 6,500 kl from Brazil in 2008. 200 thousand kl of ETBE are likely imported from the U.S. in 2009. In addition, approximately 12,600 mt of biodiesel was imported in 2008, roughly on par with the past 4-year trend. (Please see Statistical Tables at the end of this report).

Investment

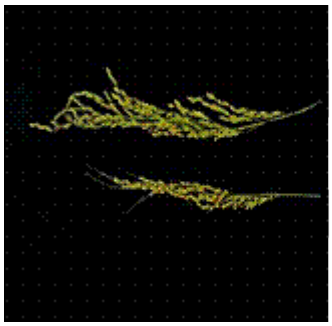
Japan is engaged in a mixture of public and private investment and development projects in other countries. In terms of development, in order to help reduce green house gas emissions Japan will provide technical assistance to Southeast Asian nations, in particular, to Thailand and Vietnam from 2010.

Several Japanese trading companies have started to invest in Malaysia and Indonesia for producing biodiesel from palm oil and bioethanol from sugar cane and jatropha.

Some Japanese trading companies have shown interest in Brazilian ethanol investments. This includes sugar cane farms as well as the associated ethanol production facilities. For example, in July 2008 Mitsui and Petrobras announced a joint venture in the cerrado region of the Brazilian state of Goias. One of the main goals is to export the sugar-based ethanol overseas, including to Japan. The firm plans to start the operation of its ethanol facility in the second half of 2009. The production capacity is 200 thousand kl per annum.

RESEARCH AND DEVELOPMENT

Japan's scientific community, including universities, public and private research institutions, has been expending significant effort toward basic and applied research related to biofuel. For example, areas of priority research emphasis include development of high yield rice for biofuel and research for biofuel production from cellulosic materials. For high yield rice, MAFF aims to develop such rice of which yield is twice more than rice for food (approximately 10 MT per hectare).



Source: MAFF

Statistics

Biofuel Production/Consumption/Trade (KL)

	2003	2004	2005	2006	2007	2008
Ethanol for Industry Use						
Beginning stocks	0	0	0	0	0	0
Production	330083	389375	394754	509813	534398	540322*
Imports	403911	494562	509161	502324	468011	452999
Total supply	733994	883937	903915	1012137	1002409	993321
Exports	132	207	22664	156	193	194
Consumption	733862	883730	881251	1011981	1002216	993127
Ending stocks	0	0	0	0	0	0

HS Codes: 220710, 220720
Sources: METI, MOF
*Estimate

Biofuel Production/Consumption/Trade (KL)

	2003	2004	2005	2006	2007	2008
Bioethanol for Transportation Use						
Beginning stocks	0	0	0	0	0	0
Production	0	0	0	30	90	200
Imports	0	0	0	0	0	0
Total supply	0	0	0	30	90	200

Exports	0	0	0	0	0	0
Consumption	0	0	0	30	90	200
Ending stocks	0	0	0	0	0	0

Souce: MAFF

Biofuel Production/Consumption/Trade (KL)

	2003	2004	2005	2006	2007	2008	2009*
Bio-ETBE							
Beginning stocks	0	0	0	0	0	0	-
Production	0	0	0	0	0	0	-
Imports	0	0	0	0	7500	6500	200000
Total supply	0	0	0	0	7500	6500	-
Exports	0	0	0	0	0	0	-
Consumption	0	0	0	0	7500	6500	-
Ending stocks	0	0	0	0	0	0	-

* *Forecast*

Biofuel Production/Consumption/Trade

	2003	2004	2005	2006	2007	2008
Biodiesel						
Beginning stocks	0	0	0	0	0	0
Production(KL)	0	0	0	5000*	5000*	10000*
Imports(MT)**	9584	12639	12349	16929	12808	12576
Total supply	0 9584(MT)	0 12639(MT)	0 12349(MT)	5000(KL) 16929(MT)	5000(KL) 12808(MT)	5000(KL) 12576(MT)
Exports	0	0	0	0	0	0
Consumption	0 9584(MT)	0 12639(MT)	0 12349(MT)	5000(KL) 16929(MT)	5000(KL) 12808(MT)	5000(KL) 12576(MT)
Ending stocks	0	0	0	0	0	0

HS Code: 382490-200

** MAFF Estimate, ** Including other than biodiesel*